Center Independent Research & Development: GSFC IRAD

Enabling Low-Cost, Ride-Share Access to Sun-Earth Libration Point Orbits (LCRS2LP)

Completed Technology Project (2017 - 2018)

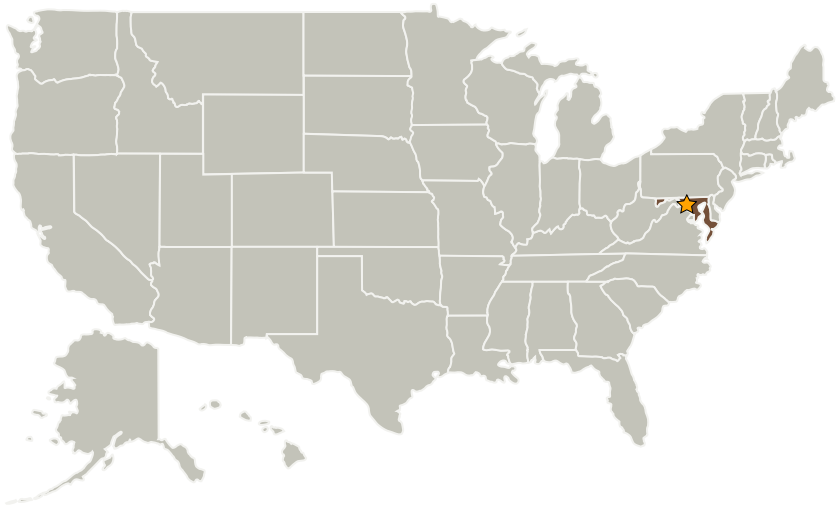
Project Introduction

This study will investigate the solution space in transferring from a geostationary transfer orbit to large-amplitude orbits about the Sun-Earth L1 or L2 Libration Points. The transfer will be accomplished by using excess capability from the frequently manifested geostationary missions.

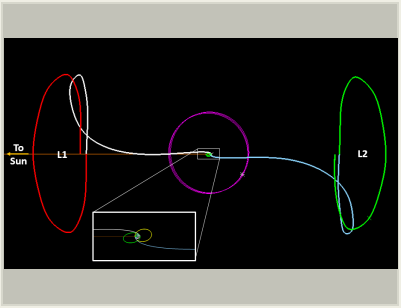
Anticipated Benefits

Every year there are multiple missions to geosynchronous transfer orbit with commercial, civil, and Department of Defense customers as the prime payload. Oftentimes, the launch vehicle has significant excess payload that is wasted. Recently, efforts have been undertaken whereby a propulsive ESPA (EELV Secondary Payload Adapter) Ring device could be flown as a secondary payload to take advantage of this excess capability to orbit. Additionally, there is the possibility of a long-life package added to the Centaur upper stage of an Atlas V expendable launch vehicle. Such a package could enable excess Centaur capability to be used for an additional upper stage burn to allow a secondary payload to achieve a transfer to the Libration Points.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland



Sample trajectory going from GTO (Geostationary Transfer Orbit) to the Sun-Earth L1 & L2 Libration Orbits

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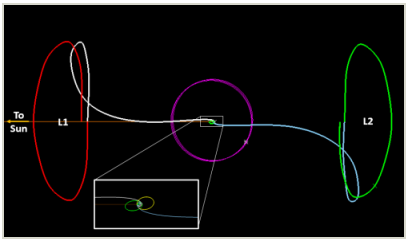
Primary U.S. Work Locations
Maryland

Images



GTO to L1 & L2 Libration Point Orbits
Sample trajectory going from GTO (Geostationary Transfer Orbit) to the Sun-Earth L1 & L2 Libration Orbits
(https://techport.nasa.gov/image/28402)

Organizational Responsibility

Responsible Mission Directorate:
Mission Support Directorate (MSD)

Lead Center / Facility:
Goddard Space Flight Center (GSFC)

Responsible Program:
Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:
Peter M Hughes

Project Managers:
Jason W Mitchell
Timothy D Beach
Lavida D Cooper

Principal Investigator:
Michael A Mesarch

Co-Investigator:
Sabrina N Thompson

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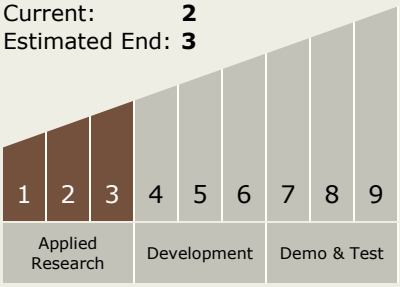
Completed Technology Project (2017 - 2018)

Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **3**



Technology Areas

Primary:

- TX17 Guidance, Navigation, and Control (GN&C)
  - TX17.5 GN&C Systems Engineering Technologies
    - TX17.5.5 Vehicle Flight Dynamics and Mission Design Tools/Techniques

Target Destinations

Foundational Knowledge, Others Inside the Solar System

Supported Mission Type

Projected Mission (Pull)